THE NAVIGATOR

AFRP 50-3, Volume XXVII, Number 2, Summer 1980

Stand Tall

The wings and crest above your pocket mark you an extraordinary man.

You are a scientist.

Temperature, dew point,
airspeed, heading,
pressure, altitude,
last known position, time and drift—
these are the variables in your equation.

Electronic devices, plotters,
flight instruments, charts,
chronometers, calculators,
books of tables, sextants, and dividers—
these are the tools in your laboratory.

Deductive reasoning, grid,
pressure pattern, Loran,
celestial, consolan,
distance measuring equipment, radio, and radar—
these are the methods of your inquiry.

You are an artist.

You weave away mystery
and clothe yourself with the pure garment of logic.

You chip away formlessness
leaving for yourself the sculptured monument of truth.

You paint away the unknown
with bold strokes on the canvas of certainty.

You are the intellect of every crew with which you serve.

You are the Navigator.

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FROM THE EDITOR

"Retention is the buzz word for today..." and you'll learn why after reading our lead article on navigator retention. Your future and that of the Air Force will be directly affected by the decisions and efforts being made toward solving the retention problem. Obviously, this is a *must read* article for all navigators.

During the past year, THE NAVIGATOR has made an intentional, aggressive effort to address the important issues affecting the navigator career field while also providing a diverse selection of technical, general interest, and historical subjects. Your enthusiastic response indicates that we've been reasonably successful in this endeavor—thanks to the fine cooperation received from individuals and offices throughout the Air Force, especially the folks at AFMPC.

Speaking of the personnel magicians, you're frequently told to "shoot for the stars" when mapping out your career goals. To follow through on this advice, we think you should know who the "stars" are. Therefore, we've included a thumbnail sketch on all the general officers wearing wings like ours. Perhaps we'll see you in this group soon.

As this edition goes to press, my tour as your editor comes to an end. Captain Walter W. Woodruff will assume the editor's desk with the Winter '80 edition. I am indeed grateful for the abundant support that you've given me and trust that you will continue the same for "Wes." Next stop—Lakenheath!

TO THE EDITOR

Dear Editor 3 April 1980

Over the years I have read THE NAVIGATOR with interest and have been pleased with its content and willingness to address some of the more controversial aspects of the navigator field. Without a doubt, one of the more controversial issues has been the one addressing navigator command and career opportunities. The numbers indicate that the navigator career field has not responded to the needs of our young officers in the areas of promotion and command opportunity. The reluctance "in the field" to move out at a satisfactory pace to correct this problem is disappointing, particularly as it does not reflect the policies of the Chief of Staff or the Directorate of Operations, Plans and Readiness with whom I have talked directly. An objective look at the leadership potential embodied in the navigator career field can only reveal an immense untapped resource that is sorely needed by today's Air Force. The old cliches used by some people to defend the command arena from intrusion by the navigator are just that; "old cliches" that have outlived their time.

The pilot commanders I have known in my career that support the inclusion of navigators in the command field have without exception been outstanding commanders and the type of individuals who feel comfortable in a competitive environment.

The inclusion of navigators in command positions and the attendant competitive threat to some potential pilot commanders are not imagined, they are real. Some of them would lose to navigators using "best qualified" criteria. Their loss would be the Air Force's gain.

The changes that are needed will be slow in coming despite policy expression to the contrary. It can only happen as long as all of us in the flying profession, pilots and navigators alike, insist on the best in command and leadership positions.

Another point, however, needs to be made. Whether an individual is a pilot, navigator, EWO, WSO, or whatever, one needs another career area of qualification to not only make you a broader, more capable officer, but to protect yourself from having no area of expertise in case of physical disqualification, to provide a career change of pace, and to stimulate your interests in other Air Force mission areas. In my case, I chose air traffic control and command, control and communications, which enhanced my career potential and led to both more opportunities and some career success. I've spent many years in the Pentagon where we are collectively and fundamentally blind to whether an individual is even rated at all. We simply want what Air Force life demands—dedication, productivity, integrity, and the willingness to be part of a hard charging team. It's all out there—stars and all—and being a navigator is still a good way to begin.

I trust your publication will continue to persevere and dedicate itself to the betterment of the navigator and the Air Force.

Van C. Doubleday

VAN C. DOUBLEDAY, Major General, USAF
Deputy Director for Strategic C^3 Systems
Organization of the Joint Chiefs of Staff

Continued on page 23

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Department of the Air Force

THE NAVIGATOR

Proudly Serving Air Force Navigators Around the World Since 1953

SECRETARY OF THE AIR FORCE
DR HANS MARK

COMMANDER AIR TRAINING COMMAND
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COL ROY K. BALILES

Editorial Staff

EDITOR
CAPT RICHARD E. GARR, JR.

PRODUCTION & ART EDITOR
FREDERICK A. HULL

ASSISTANT EDITOR
PATRICIA R. PALMER

ADMINISTRATIVE SPECIALIST
SSGT BRINDA S. CHINH

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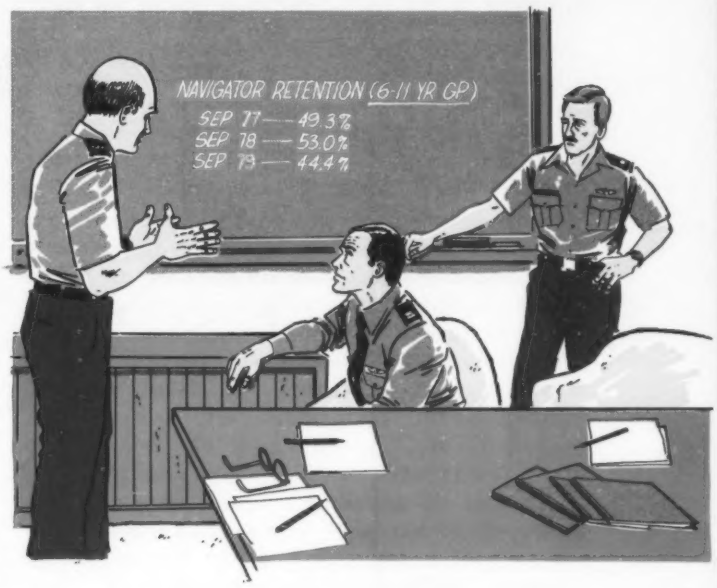
Our Reserve KC-135 Stratotanker eagerly awaits the arrival of F-105 Wild Weasels from the Georgia Air National Guard. About to launch on an aerial refueling mission? You may want to practice an "ADF Magnetic Bearing Rendezvous." See page 24 for more details.

What's being done about retention and how will it affect you? "Navigator Retention" on page 5 is another in our series of career-interest articles from AFMPC.

Distribution: One copy per two navigators.

Navigator Retention

Captain James R. MOAT
AFMPC/MPCF
Randolph AFB, TX



Do you remember good old Charlie Starlifter? or Harry Herk? or Guy Gib? What ever happened to them? Promoted, PCS'd, or just got out? More and more the answer is "separated." If you can answer "Why?" and "What do we do about it?" you've just solved the number one personnel problem in the Air Force today. Retention is the buzz word for today and it covers a host of actions that are ongoing at all levels to reduce our loss of experienced personnel. Everyone is concerned, from Congress and the Secretary of Defense to your squadron commander, and all are working the problem. Let's take a look at how we got where we are, what is being done, and what it means to you.

We haven't always had a retention problem. You may be one of those "old heads," with at least four or five years service, who remembers such terms as *Palace Furlough, Palace Chase, Early Out* and other such programs designed to cope with overages. What happened? Overages one year—shortages the next. Who couldn't count the beans? Let's look at the scenario and see if you would have made the same decision as the Air Force planners.

When the Southeast Asia war abruptly ended, many of the aircraft with large navigator requirements simply disappeared. When is the last time you saw an EC-47, AC-47, AC-119 or a C-121? Some squadrons of F-4, AC-130, and C-130 aircraft were transferred to the Reserves and crew ratios were reduced in the C-141, B-52, and KC-135 as the force phased down to a peacetime footing. Now it's decision time. Do you forcibly separate expensively-trained, combat-seasoned, rated officers and acquire new people simply to balance your year groups? Or do you slow down accessions and keep your trained, combat veterans in reserve by placing them temporarily in support jobs? Right or wrong, the Air Force chose the second option. Many navigators, far more than requirements dictated, went into the supplement and both UNT and UPT rates declined (with plans to increase them when attrition took care of the overages). Navigator production dropped to only 472 in 1978, the lowest of any period since the Korean War (Figure 1).

Figure 1 ***NAVIGATOR PRODUCTION BY YEAR***

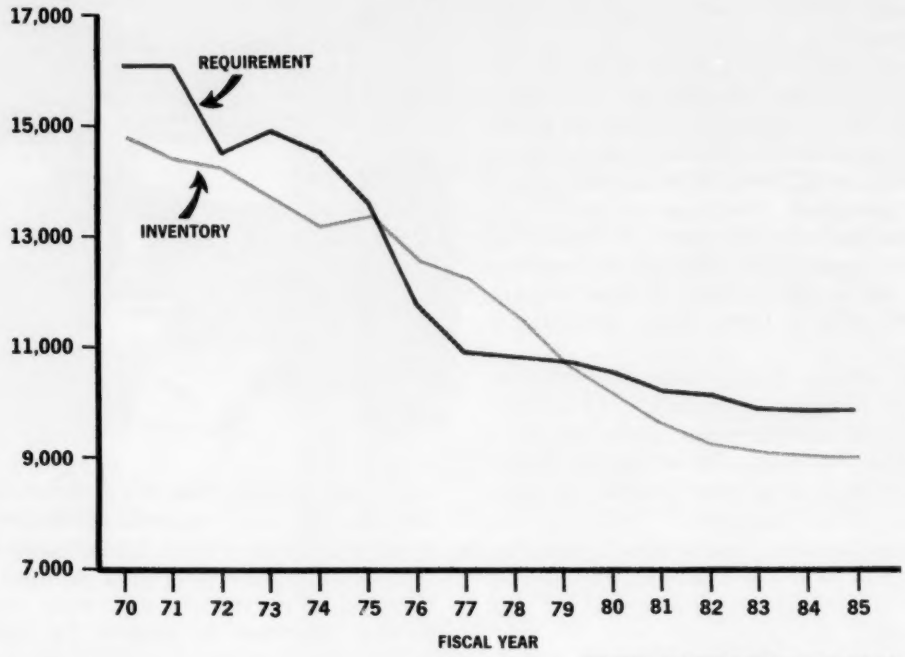
FY	*NAVS*	*FY*	*NAVS*	*FY*	*NAVS*	*FY*	*NAVS*
1950	148	1960	1,557	1970	956	1980*	600
1951	1,129	1961	2,371	1971	1,037	1981*	650
1952	1,057	1962	1,239	1972	1,324	1982*	700
1953	445	1963	1,137	1973	1,351	1983*	750
1954	685	1964	984	1974	1,356	1984*	800
1955	2,797	1965	1,009	1975	1,231		
1956	2,462	1966	838	1976	810		
1957	2,791	1967	782	197T	201		
1958	2,112	1968	805	1977	653		
1959	1,507	1969	827	1978	472	*Projected	
				1979	550		

Alas! Even this great plan didn't anticipate two important developments. Separations and retirements were higher than forecasted and the rated requirements did not drop as fast as planned. For example, despite anticipated replacement of C-141 and C-5 navs by INS equipment in the 1977-1980 time frame, we still have substantial numbers of navigators in both aircraft.

What now? We're short by about 400 navigators for 1980 and expect to be about 900 short by 1985 (Figure 2). The situation is worse in the pilot force with a shortage of 2,000 this year and possibly a shortage of 3,500 in 1985.

ACTIVE NAVIGATOR FORCE
(0-1 thru 0-5)

Figure 2



SOURCE: AF/MPPPP/MPME - 13 DEC 79

We're working on the numbers—expanding navigator and pilot production—but that compounds the experience problem we're having in our line units. Everybody can't be a "new guy." This is where retention comes in. You've got to keep your qualified people on board to train the "newbys" and keep your experience levels high enough so that you can fight a war—and win. Figure 3 provides a breakdown of navigator retention rates by weapon system.

****NAVIGATOR RETENTION RATES***
(6-11 Year Cumulative Average)

Figure 3

WEAPON SYSTEM	*MAR 77*	*SEP 77*	*MAR 78*	*SEP 78*	*MAR 79*	*SEP 79*	*MAR 80*
Fighter	61.9%	56.2%	56.2%	56.7%	44.3%	36.9%	39.5%
Recce	56.7	51.9	49.7	27.3	33.7	43.4	51.8
Bomber	65.8	62.0	69.6	67.1	51.2	44.8	55.7
Tanker	40.0	31.8	40.5	43.7	33.7	46.9	54.5
Strat A/L	65.3	49.6	44.8	33.9	32.8	48.4	61.0
Tac A/L	56.7	49.6	56.2	62.3	63.9	62.9	58.1
Overall	56.4	49.3	53.6	53.0	43.3	44.4	50.2

****If the March 1980 rate persists, for every 100 navigators entering their sixth year of Total Active Federal Commissioned Service (TAFCS), only 50 will complete their eleventh year—the point at which***

most would compete for major. These rates are based on a one-year period preceding the date and have been adjusted to account for officers separating through abnormal personnel actions. It is important to realize these numbers are not actual head counts, but rather, cumulative rates used to show a trend.

Good News & Bad News

There's good news and bad news with the increased emphasis on retention. The bad news is that our current shortages are temporarily reducing opportunities for a tour in the rated supplement. But the good news is increased promotion opportunity, greater possibilities in the ops staff, increased command billets, fewer additional duties, and more emphasis on you, the individual.

Contrary to what you may hear, the rated supplement is not dead, but there have been some major changes in its size, tenure and AFSCs. In FY78 there were 5,840 rated officers (1,841 navs, 3,999 pilots) in the supplement. By the end of FY80 there will only be about 2,400 rated officers (approx 900 navs) assigned to support duties. In the era of overages it was not unusual for an officer to spend 5 to 8 years in the supplement, but this is no longer true. Those navigators selected for the supplement can expect to spend 3 or 4 years assigned to support duties and then return to the operations world. Later, at the lieutenant colonel and colonel levels, they'll have an option of using either their rated or support experience.

Even though the total size of the supplement is down, the shorter tours will mean a continuous flow for a maximum number of navigators into and out of supplement duties where they can obtain line, staff, and command experience in support areas. In the past, the rated supplement covered the full spectrum of support duties. In the future, the primary areas will be in engineering (where shortages are severe), logistics, and precommissioning programs. Opportunities in these fields are available even today.

If you're in the younger year groups, the law of supply and demand works in your favor. These year groups are manned at less than the desired level. With fewer navigators available to do the same number of jobs, your chances of gaining staff experience are excellent.

For the older year groups there are a limited number of jobs requiring the grade and experience of lieutenant colonel navigators. For example, there are requirements for only 3,800 rated lieutenant colonels but we have over 5,600 on board. For this reason, you'll see some lieutenant colonels filling junior officer billets. The anomaly is unfortunate, but below the lieutenant colonel grades, opportunity is knocking and the system is changing to make the service more attractive. For example, officer shortages have caused promotion opportunity to increase from 97.5% to fully qualified for captain; from 80% to 90% for major; and from 70% to 75% for lieutenant colonels.

Selective Continuation is another action taken to retain experienced officers in needed specialties. The program applies to reserve officers who twice fail temporary promotion to major and allows those officers selected by a board to continue service in their present grade. There is also a program that will allow many reserve officers in rated skills to voluntarily continue past 20 years of active service. Additionally, the opportunity for a regular commission for navigators has increased steadily, from 40% in 1978 to 75% in 1980.

In the past, career counseling for navigators went something like this, "Get out of operations as fast as you can and stay out as long as you can." Now the reverse is true. The operations staff, more than ever, is a challenging and rewarding area for navigators. With the current and projected shortages, our first priority is to keep front line units fully manned. Since the pilot deficit is even more severe than the nav shortfall, a larger percentage of navigators will fill specific and general operations staff positions. Also, some ops staff positions, which formerly required pilots, are being converted to navigator authorizations. This is due to the severe shortage of pilots and lower initial training costs for navs ($67,000 vs $250,000 for pilots) plus higher RTU/CCTS costs for pilots. You will see more and more opportunities opening for company and junior field grade navigators in plans, scheduling, training, command and control, etc.

Just a few years ago, navigators commanding flying units were as rare as a navigator in a Daedalian Executive Board meeting! Today, navigators command 22 flying squadrons, serve as operations officers in 28, and fill 106 flight commander positions. Six have advanced to wing command and deputy for operations positions. Progress was slow in starting but now General Allen, Chief of Staff of the Air Force, has given his full support to selecting commanders of flying organizations based on qualifications rather than

Figure 4

NAVIGATORS IN COMMAND POSITIONS
Rated AFSCs - 31 Dec 79
Flying Units

	ATC	TAC	USAFE	PACAF	AAC	MAC	SAC	AFSC	TOTAL
Wg/CC	0	0	0	0	0	1	0	0	1
Wg/CV	1	0	0	0	0	0	0	0	1
Wg/DO	1	0	0	0	0	0	0	0	1
Wg/ADO	1	1	0	0	0	1	0	0	3
Sq/CC	6	8	2	1	0	3	2	0	22
Sq Ops Off	6	4	4	1	0	6	6	1	28
Flt Comdr	27	28	25	8	1	6	11	0	106
Subtotal	42	41	31	10	1	17	19	1	162

aeronautical ratings. Figure 4 shows where navigator commanders are by MAJCOM.

What's Being Done?

In trying to identify the irritants that caused rated officers to leave, additional duties kept cropping up as a major offender. Many were not mission-related and included such hummers as "CONEX Container Counting Officer," "Pallet Inventory Officer," "Silver Reclamation Monitor," etc. Hopefully, most of these have now fallen by the wayside and those that remain are directly related to the mission (scheduling, stan/eval, plans, safety, training, etc). Additionally, a plan is being developed to assign about 400 nonrated officers to flying organizations to perform administrative tasks previously accomplished on an additional duty basis by rated officers. This should allow you more time to concentrate on perfecting your operational skills.

To improve job satisfaction, the Air Force Chief of Staff has implemented *BUCK STOP*——a program to decentralize decision making to the lowest appropriate level. The BUCK STOP philosophy says it's your job, you figure out how best to do it and then do it. You're charged with both the authority and responsibility for accomplishment. You'll see more and more opportunities to demonstrate leadership capabilities and enjoy the challenges of your profession.

Finally, there's you—the main attraction—the person we're really trying to keep. Look what's happened over the last two years to eliminate some of the irritants you've identified through surveys and seminars: decontrol of the OER, higher promotion rates, MAJCOM programs to streamline operations for crews, seminars with your CINCs and MAJCOM commanders, Congressional-sponsored legislation for increased compensation and housing allowances, and higher esteem for the military from the civilian populace.

The assignment process is also undergoing change. A new "Assignment Information Directory" has been sent to each flying squadron to help you understand the assignment process and make realistic career decisions. Your squadron commanders will also play greater roles in assignments and we've sent them a "Commander's Information Brochure" to keep abreast of current issues. Your MPC and MAJCOM resource managers want to talk to you and are doing everything they can to satisfy your desires within the rated requirement structure. Specific problems, such as the WSO overseas imbalance, are being worked at the highest levels. Today, aircraft conversions are being reprogrammed to accelerate placement of single-seat fighters in overseas areas to reduce PCS turbulence and extend the WSO's time between overseas tours.

Hundreds of navigators have separated over the last few years. But after trying civilian life, many have applied for return to Air Force active duty. There are a myriad of reasons why they came back, from security and benefits to camaraderie and challenge. The common element is that all thought the "grass was greener on the other side." In fact, few realized how much they enjoyed the Air Force and its people—until they left.

As you can see, a lot of people in a lot of places are working to make the Air Force more attractive. We can't change the world overnight, but over the last two years the accomplishments have been significant; everybody's working the problems and working them hard. The Air Force needs you—your skills, your qualifications and your experience. Stay with us. Our future and yours look bright.

A 1969 University of Colorado graduate, Capt Moat has a master's degree in Human Resources Management from Pepperdine University. After UNT, he flew C-130s at Pope AFB, followed by a SEA tour in the AC-130 gunship. He then was stationed at MacDill, Kadena, Holloman, and Hill AFBs in the F-4. Capt Moat now works in the Officer Retention Group, HQ AFMPC.

To acquaint you with your senior navigator and aircraft observer leaders and in recognition of their support of the navigator profession, we proudly present

THE GENERALS

(Data current as of 1 June 1980)

Lieutenant General Gerald J. Post

- **Duty Title** - Director, Defense Logistics Agency
- **Date of Rank** - 1 August 1978
- **Commission Source** - Aviation Cadet
- **Education/PME** - M.B.A./ACSC, Army War College
- **Former Position** - Asst DCS, Systems and Logistics, HQ USAF

Major General John E. Kulpa, Jr.

- **Duty Title** - Director of Special Projects, SAF; also Deputy Commander of Satellite Programs (AFSC)
- **Date of Rank** - 14 June 1973
- **Commission Source** - U.S. Military Academy
- **Education/PME** - B.S., M.S./SOS, ACSC, NWC
- **Former Position** - Director, Office of Space Systems, SAF

Major General John W. Huston

- **Duty Title** - Chief, Office of Air Force History, HQ USAF
- **Date of Rank** - 1 July 1973
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.A., M.A., Ph.D./AWC
- **Former Position** - Chairman, AF Reserve Policy Council, ARPC

Major General John W. Hepfer

- **Duty Title** - Commander, Ballistic Missile Office, HQ AFSC
- **Date of Rank** - 1 May 1974
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.S., M.A./SOS, ACSC, AWC
- **Former Position** - Commander, Rome Air Development Center

Major General Doyle E. Larson

- **Duty Title** - Commander, Electronic Security Command
- **Date of Rank** - 1 May 1974
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.A., M.A./SOS, AFSC, AWC
- **Former Position** - DCS for Intelligence, HQ SAC

Major General Howard M. Estes, Jr.

- **Duty Title** - Deputy Director for Programs & Resources, NSA; also Deputy Chief, Central Security Service
- **Date of Rank** - 1 July 1974
- **Commission Source** - U.S. Naval Academy
- **Education/PME** - B.S., M.S., Ph.D./SOS, AFSC, ICAF
- **Former Position** - DCS for Plans & Programs, HQ AFLC

Major General Walter D. Reed

The Judge Advocate General, HQ USAF	- Duty Title -	
1 July 1974	- Date of Rank -	
Aviation Cadet	- Commission Source -	
B.C.S., J.D., LL.M.	- Education/PME -	
Asst Judge Advocate General	- Former Position -	

Major General Irwin P. Graham

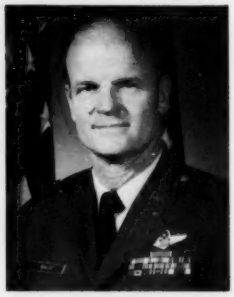
	- Duty Title -	DCS, Plans, HQ PACAF
	- Date of Rank -	1 December 1975
	- Commission Source -	ROTC
	- Education/PME -	B.S., M.S., M.B.A./ACSC, ICAF
	- Former Position -	Deputy Director for Politico-Military Affairs, JCS

Major General John B. Marks, Jr.

Asst Chief of Staff, Intelligence, HQ USAF	- Duty Title -	
1 July 1976	- Date of Rank -	
OCS	- Commission Source -	
B.S., M.S./ACSC	- Education/PME -	
Commander, Foreign Technology Division (AFSC)	- Former Position -	

Brigadier General Frederick L. Maloy

	- Duty Title -	Director, Communications-Electronics, US REDCOM
	- Date of Rank -	14 December 1975
	- Commission Source -	Aviation Cadet
	- Education/PME -	B.S./ACSC, AFSC, ICAF
	- Former Position -	Director for Data Automation, HQ USAF



Brigadier General Charles B. Jiggetts

Director, Communications and Data Processing, PACOM	- Duty Title -	
29 March 1977	- Date of Rank -	
ROTC	- Commission Source -	
B.A./SOS, ACSC, ICAF, AWC	- Education/PME -	
Commander, Northern Communications Area (AFCC)	- Former Position -	

Brigadier General Donald L. Evans

	- Duty Title -	DCS, Data Systems, HQ SAC
	- Date of Rank -	14 January 1978
	- Commission Source -	OCS
	- Education/PME -	B.A./SOS, ICAF
	- Former Position -	Asst DCS, Intelligence

Brigadier General Keith D. McCartney

Commander, USAF Recruiting Service, HQ ATC	- Duty Title -	
31 May 1978	- Date of Rank -	
ROTC	- Commission Source -	
B.S./SOS, ICAF	- Education/PME -	
Executive Asst to the Secretary of the Air Force	- Former Position -	

Brigadier General Titus C. Hall

	- Duty Title -	Deputy for Reconnaissance & Electronic Warfare Systems, HQ ASD (AFSC)
	- Date of Rank -	14 June 1978
	- Commission Source -	ROTC
	- Education/PME -	B.S., M.S./SOS, ACSC, ICAF
	- Former Position -	Commander, 2750th Air Base Wing

Brigadier General Winston D. Powers

DCS, Communications, Electronics & Computer Resources, ADCOM	- Duty Title -	
31 July 1978	- Date of Rank -	
Aviation Cadet	- Commission Source -	
B.A./SOS, ICAF	- Education/PME -	
Deputy Director, Command, Control & Communications, HQ USAF	- Former Position -	

Brigadier General Harry H. Bendorf

	- Duty Title -	Deputy Director for Force Development & Strategic Plans, JCS
	- Date of Rank -	31 March 1979
	- Commission Source -	ROTC
	- Education/PME -	B.S., M.A./SOS, ICAF
	- Former Position -	Deputy Director for Force Development, HQ USAF

Brigadier General Carl R. Smith

- **Duty Title** - Military Asst to the Secretary of Defense
- **Date of Rank** - 29 May 1979
- **Commission Source** - ROTC
- **Education/PME** - B.S., M.S./ACSC, ICAF, NWC
- **Former Position** - Chief, Nuclear Policy Branch, SHAPE

Brigadier General Attilio Pedroli

- **Duty Title** - Commmander, Defense Industrial Supply Center (DLA)
- **Date of Rank** - 29 June 1979
- **Commission Source** - Aviation Cadet
- **Education/PME** - SOS, ACSC
- **Former Position** - Commander, 323d Flying Training Wing

Brigadier General Richard W. Pryor

- **Duty Title** - Commander, Northern Communications Area (AFCC)
- **Date of Rank** - 31 July 1979
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.A., M.A./SOS, ACSC, ICAF
- **Former Position** - Commander, Southern Communications Area

Brigadier General Raymond C. Preston, Jr.

- **Duty Title** - Deputy General Manager, NATO AEW&C Program Management Agency
- **Date of Rank** - 27 August 1979
- **Commission Source** - ROTC
- **Education/PME** - B.S., M.S./SOS, ACSC, ICAF
- **Former Position** - Chief of Staff, AFSC

Brigadier General Allen K. Rachel

- **Duty Title** - Asst DCS, Intelligence, HQ SAC
- **Date of Rank** - Assumed rank on 14 March 1980
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.A., M.B.A., Ph.D./SOS, ICAF, Army CGSC
- **Former Position** - Commander, 341st Strategic Missile Wing

Brigadier General Donald W. Goodman

- **Duty Title** - Executive to the Chief of Staff, SHAPE
- **Date of Rank** - 30 May 1980
- **Commission Source** - OCS
- **Education/PME** - B.A./SOS, ICAF
- **Former Position** - Chief, Combat Plans Division, HQ SAC

Brigadier General Maurice C. Padden

- **Duty Title** - Deputy Director for Operations, National Military Command Center, JCS
- **Date of Rank** - Assumed rank on 1 May 1980
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.A., M.A./SOS, AFSC, AWC
- **Former Position** - Commander, 443d Military Airlift Wing (MAC)

*Colonel Elbert E. Harbour

- **Duty Title** - Deputy for Airlift & Training Systems; also Director, C-X SPO, HQ ASD (AFSC)
- **Date of Rank** - 15 March 1974
- **Commission Source** - ROTC
- **Education/PME** - B.S., M.B.A./SOS, ICAF
- **Former Position** - Director, EF-111A Tactical Jamming System Program Office

*Colonel Larry N. Tibbetts

- **Duty Title** - DCS, Manpower & Personnel, HQ AFLC
- **Date of Rank** - 8 May 1974
- **Commission Source** - ROTC
- **Education/PME** - B.A., M.S./SOS, ACSC, ICAF, Naval War College
- **Former Position** - Asst for Colonel Assignments, HQ AFMPC

*Colonel Bernard P. Randolph

- **Duty Title** - Program Director, Space Defense Systems (AFSC)
- **Date of Rank** - 21 September 1974
- **Commission Source** - Aviation Cadet
- **Education/PME** - B.S.(2), M.S.(2)/SOS, ACSC, AWC
- **Former Position** - Program Director, AF Satellite Communications System

**Brigadier General Selectee*

the EB-57: like most antiques its value

B-57? Didn't the British build it to be a bomber? Don't you guys have to wear pressure suits at 70,000′? Is it still flying? Yes; we can't go to 70,000′; and the B-57 is indeed still flying. The venerable B-57 *Canberra* is very much alive and well having recently become one of TAC's newest (oldest?) resources after a long tour of service in the now defunct Air Defense Command. Each issue of THE NAVIGATOR has articles on the latest equipment and aircraft, and I thought it might be a change to bring readers up to date (back to date?) on the role of a vintage bomber in today's modern Air Force.

First, a bit of history. The B-57, an English design, was modified and manufactured by Martin Aircraft Corp in Baltimore. The first series was a light bomber, but subsequent versions have included: high altitude reconnaissance and weather reconnaissance configurations; night bombers in the early years of the Southeast Asia conflict; and two electronic warfare models. All of the *Canberras* have found their way to Davis-Monthan's boneyard, except one squadron of EB-57B and C models and a handful of special high altitude, long wing 57s flown by NASA in Houston. Sixteen electronic warfare EB-57Bs and three dual control B-57C pilot trainers assigned to the 158th Defensive Systems Evaluation Group (DSEG) of the Vermont Air National Guard are all that remain in the active inventory. Built in 1952, these are the oldest aircraft in the Air Guard system, and may well be the oldest Air Force tactical asset.

Enough on age—why is the *Canberra* still around, and what mission can it possibly accomplish? The 158th DSEG's primary responsibility under the reorganized Air Defense Tactical Air Command (ADTAC) is to provide electronic warfare training and tests of North America's air defenses against a manned bomber attack. We continually participate in air defense exercises as well as deploy to specific F-106, F-101, F-4 and F-15 air defense squadrons for a week of intense local training. This insures the interceptor crew members' proficiency against a maneuverable, high and low altitude, electronic countermeasures-equipped foe—"The Friendly Enemy." These missions are not for competition as sometimes occurs between fighter units, but rather the B-57 crew helps interceptor crews and weapons director teams gain necessary experience and proficiency. Feedback from these units leads us to believe the training is excellent. We often notice that the skill levels are much higher after 4 or 5 sorties. By the end of the week's flying, the B-57 crew has employed its whole bag of ECM, communications jamming and evasive tricks, and the unit's "hack rate" usually has risen dramatically.

increases with age

Captain James R. GRANT
Vermont ANG/158 DSEG
Burlington IAP, VT

EB-57s also participate in most of the large joint exercises with stand-off jamming, fighter-bomber escort, and chaff-laying missions being assigned. Deployments regularly take us all over the US and Canada, and occasionally as far as Iceland, Alaska and Korea. In addition, ground radar jamming, while exercising and testing the SAGE system, is provided during most deployment flights and air-to-air sorties.

The rear seat crew member is a combination navigator/copilot/electronic warfare officer, although the AFSC requires him to be an EWO. Like the aircraft, the electronic countermeasures available on board are not new. Older EWOs would recognize the 10 jammers with most being common to the early model B-52s. For radiation devices, the EWO can choose from ALT-6Bs, ALT-13s (nonprogrammable 28s) ALR-18s, ALT-16s, an ALQ-93 and an ALQ-83 range gate stealer along with the capacity for installing an ALQ-72 pod. Other equipment includes an APS-54 interceptor warning receiver and two large chaff dispensers carrying both high and low band chaff. ECM configurations vary according to the mission requirements. EWOs will probably notice that we have plenty of power, but not a lot of sophistication.

The airframe is fully acrobatic, though not especially fast with limits of .78 Mach at altitude and 444 KIAS on the deck. Fuel allows about 3½ hours endurance, with no in-flight refueling capability. A very large wing aids the *Canberra* in flying slower and turning faster than many modern fighters. It's not uncommon for a high performer to overshoot his first few attacks after a couple of our quick turns. Visibility through the large single canopy is outstanding—a critical advantage overlooked in aircraft design for years until the present F-15s and -16s.

The future? The Vermont Air National Guard *Canberras* will eventually go the way of the other B-57s and join the rest of our ancient air force in the Arizona desert. How soon? Who knows? Newer EA-6Bs, EF-111s and F-4Gs all have dissimilar equipment and roles, but no other current aircraft can provide the same ECM services as efficiently in these days of inflation. The *Canberra* may well be into its fourth decade of service before retirement in the 1980s.

Upon UNT graduation in 1969, Capt Grant was assigned to the KC-135 at Pease AFB, followed by the RC-135 at Kadena AB and Offutt AFB. In 1976, he joined the Vermont ANG and then completed EWOT at Mather AFB. Capt Grant now serves as an EB-57 EWO with the Vermont ANG, Burlington IAP.

Spotlight On Senior and Staff Officer EW Training

Captain Carl S. GUINSLER
323 FTW/DOT
Mather AFB, CA

Electronic warfare (EW) plays a vital role in our military capability and planning, but to many people EW is complicated, mysterious and even stifling. Just as technology has rapidly changed the face of modern warfare, the scope and complexity of EW have also changed drastically. Electronic warfare has evolved from the traditional jammer versus radar scenario to an era in which EW now permeates all aspects of the modern military environment. The challenge for the military manager in this time of lasers, charged particle beams and communication jamming is to get the right information to the right people in a timely manner. Due to this increased emphasis and expanded scope of EW, the Air Staff has validated the requirement for specialized electronic warfare training for senior officers not having an EW background and for newly assigned EW staff officers. To attend either the "Senior Officer Electronic Warfare Course" (ATC Course B-V7C-G) or the "Electronic Warfare Staff Officer Course" (ATC Course B-V7C-H), both conducted at Mather AFB, California, individuals should contact their command quota monitor or Major Bill Brown (HQ ATC/DONN) at AUTOVON 487-5559/3290.

Senior Officer Electronic Warfare Course

The three-day Senior Officer Electronic Warfare Course was implemented in August 1979 to familiarize senior commanders and managers with concepts of EW and its impact on the design, procurement, and employment of modern weapon systems. Senior officers are frequently surprised to discover the breadth of modern EW, and the degree to which EW affects their day-to-day operations. In only 21½ hours, the course covers basic EW concepts and graphically portrays the evolutionary process of EW, including the Middle East conflict, current EW problems, and the challenges of exploiting or countering future military developments. Instructors specializing in hostile weapon systems lead discussions on the complexity and seriousness of hostile military capability. Course attendees then have the opportunity to view the threat through the eyes and ears of an EW officer in a simulator for EW training.

In the simulator, the course attendees "fly" a reconnaissance mission near the Fulda Gap and then fly a Wild Weasel attack mission. (You'll appreciate your flight pay after this!) Following this analysis of the hostile threat, the course addresses the programs and equipment of friendly forces and their capability to meet the current and future challenges of conducting military operations in an EW environment. The course also covers friendly and hostile EW capability and its effects on weapon systems acquisition, evaluation, and tactics development. Later, the attendees are provided a look at the problems associated with training personnel to operate their weapon systems in a hostile EW environment. The final course session examines the capabilities and responsibilities of the EW staff officer with particular emphasis on advising military managers on all vital aspects of EW relative to employing our military hardware.

The Senior Officer EW Course provides an invaluable insight into the electronic warfare field vital to high-level decision makers, and is

available to lieutenant colonels (0-5),or above,and equivalent grade DoD civilians not possessing a 1575/2275 EW AFSC nor an EW background. The course is conducted six times a year with maximum class size of 10, and all attendees must have a SECRET clearance by class start date.

Electronic Warfare Staff Officer Course

ATC also offers a two-week Electronic Warfare Staff Officer Course specifically designed to prepare officers and equivalent grade civilians to serve in middle-management EW staff positions. This course provides a thorough discussion of all the major responsibilities of the EW staff officer. Attendees should have the 1575/2275 EW AFSC or other EW background and should be, or soon will be, assigned to an EW or related staff position. After completing the course, the EW staff officer will be prepared to resolve such problems as:

(1) If I recognize an equipment deficiency or a need to change tactics, how do I get these items into my command's statement of operational need?

(2) If I'm responsible for developing tactics or testing equipment, where can I get a copy of previous test results and what technical assistance is available?

(3) In this era of austere budgets and training range limitations, how do I make my EW training more realistic?

The course material is presented by guest lecturers and experienced staff officers assigned to the 453d Flying Training Squadron. Guest lecturers include a representative from the Intelligence Directorate at the Air Staff who discusses national level intelligence support for the major commands and responsive support for the middle manager from the intelligence community. A speaker from Air Force Systems Command's Foreign Technology Division provides a unique insight into sources of intelligence and discusses current projects. An Air Force Electronic Warfare Center representative explains their mission, organization, research products, and the services they provide to the EW staff officer. Current EW projects being tested for deployment in the '80s are briefed by a guest lecturer from the Air Force Test and Evaluation Center. Major course emphasis items include: the EW staff environment, current DoD directives on EW and staff responsibilities, United States ESM/ECM/ECCM capabilities, EW program management and staff responsibilities, and realistic EW staff problems.

The need for these courses has been proven and both have been well received by the attendees. Electronic warfare may not be the only answer for military planners but, without a doubt, EW should be part of the question. These courses provide vital information needed by you—the managers of our U.S. military forces.

Capt Guinsler entered the Air Force in 1970 via ROTC at Miami University. After UNT and EWT he was assigned to the EB-66 at Korat RTAFB, followed by the B-52H at Kincheloe AFB. Capt Guinsler now serves at Mather AFB as a Curriculum Manager in the Wing Training Division.

Navwords

Major William E. BLUE, USAF, Retired
Lakebay, WA

16

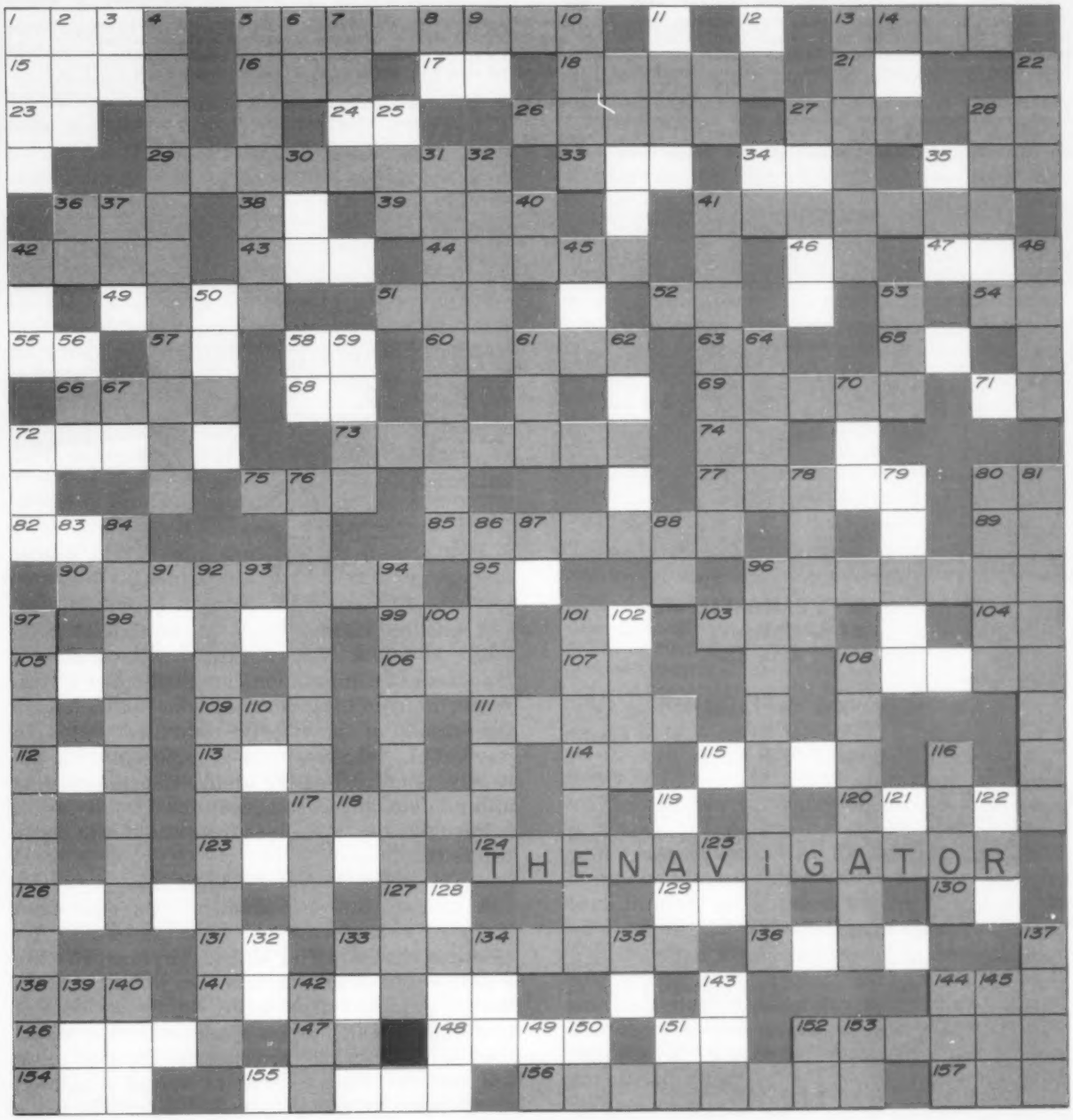
ACROSS

1. In the middle of
5. About 21 June and 22 December
13. Alfa Code for "Z"
15. To record speed or duration
16. Crew member on B-52
17. Roman numeral
18. Aeronautical map
21. Plural suffix
23. Officer of the Guard: abbr.
24. Small: abbr.
26. St. line between leading and trailing edges of a wing
27. Direction
28. Away from: prefix
29. Measured North/South
33. Profitable mineral
34. O. T. Judge
35. Belonging to him
36. Plan Position Indicator
38. Preposition
39. _____reckoning
41. Device to measure course or angle
42. Flight _____
43. Neither
44. _____meridian
46. Measure of acidity
47. Record: abbr.
49. Arms limitation
51. Latitude: abbr.
52. Time, distance, and heading
54. ___-71
55. Railroad: abbr.
57. Tellurium: abbr.
58. Not applicable
60. _____line
63. Ante meridiem: abbr.
65. Which way is___?
66. Line connecting N/S poles
68. See 65 across
69. Long range navigation system
71. Exclamation of pain
72. Good-bye
73. 0° North/South
74. Behold!
75. Determined position
77. Right _____
80. Direction
82. Twitching
85. When sun crosses equator
89. True course: abbr.

DOWN

1. Kind of bomb
2. Russian aircraft
3. I am
4. Angular dist. from celestial equator
5. Celestial nav instrument
6. To put away: st_____
7. Temporarily disoriented!
8. State - Lackland AFB
9. Roman numeral
10. Alfa Code for "E"
11. To feel interest
12. Lieutenant: abbr.
13. Highest point
14. Employ
19. C.E. construction outfit—Red_____
20. Road: abbr.
22. Type of bomb site
25. Soft wet earth
27. Run away to marry
28. The sky; firmament
30. International trade organization: abbr.
31. First line in log
32. Planet
34. Elevated railroad
35. Feminine pronoun
36. Plural: abbr.
37. Dance step
40. Drill instructor: abbr.
41. Apparent displacement
42. Common level
45. "_____& apple pie"
48. EWO officer
50. Minus
53. Solar
56. Radian: abbr.
58. Greek letter
59. Uppermost point
61. Navigation training
62. Snoopy's adversary
64. Earth's satellite
67. Roman numeral
70. Entire
72. Insect
76. Type of nav leg
78. Navigation used in polar area
79. Mistake
80. Celestial bodies
81. Angle 23° 27' with the equator
83. Contraction
84. Type of navigation
86. Instrument for measuring altitudes
87. U-Tapao: abbr.
88. Oxygen: abbr.
91. Reference: abbr.
92. Pt. where two lines meet
93. One
94. Bending of light rays
96. Local magnetic influences
97. Precise time instrument
100. Toward
101. _____hour angle
102. Break suddenly
108. Instrument for determining direction
110. Either
116. Speed measurement
118. Alcoholics Anonymous: abbr.
119. Armed conflicts
121. To or toward: prep
122. Internal Revenue Service
125. Roman numeral
128. Gas used as refrigerant
132. Duty officer
133. Cost of Living Allowance
134. Ailing
135. Roman numeral
137. Persons who man an aircraft
139. Avenue: abbr.
140. Gender
142. Flight record
143. Greek letter
144. Velocity: abbr.
145. From
149. That one
150. Army food—"ch____"
151. Elevation: abbr.
152. Be quiet!
153. Point: abbr.

90. Chart projection
95. Base in Thailand
96. Daily cycle
98. Highest of the Lepontine Alps
99. Estimated time of arrival
101. Social Security: abbr.
103. Sextant filter color
104. Small state
105. Garden tool
106. Foreign object damage
107. Instructor navigator
108. Firm and fresh
109. Radio nav aid
111. Radio detection and ranging
112. Scrap
113. Time period
114. Emergency procedure: abbr.
115. Free from storms
117. Tactical Air Navigation
120. Overpowering fright
123. _____circle course
124. Your magazine
126. Confused struggle
127. In the event that
129. River
130. Security classification
131. State - Grand Forks AFB
133. Force acting on a body in motion
136. Forward end of airplane
138. Speed through an air mass
141. Military rank
144. Flight rules
146. Each and _____
147. "Assoc. of ____d Crows"
148. Hodgepodge
151. Einsteinium: abbr.
152. Celestial _____
154. King
155. Once more
156. Time between night/sunrise
157. Kind of weather front



NAVWORDS answers on page 27

NAVIGRAMS

USAF NAVIGATION SYMPOSIUM. The Air Force Academy's Aviation Science Division will host the 3d annual USAF Navigation Symposium at the Academy, 8-12 December 1980. "Navigator Professional Development" is the theme of this Symposium which is open to all rated officers. The symposium will serve as a vehicle for information exchange among representatives of SAC, TAC, MAC, ATC, AFMPC, the ANG, the AFRES, and other agencies responsible for navigator operations, training, motivation, and retention.

The 1980 Symposium is a follow-on to the successful navigation symposium held at the Academy last year, which addressed "Navigation in the 1980s." Panel discussions with cadets and working groups of 1979 Symposium participants indicated a broad interest in command and promotion opportunities, plans for future navigator utilization, and implications for navigator motivation and retention. Early responses from the field suggest expanded senior officer participation this year. For additional information, contact Major Bob Sallee, USAFA/CWIN, at AUTOVON 259-3790.

AFM 51-40, "Air Navigation," will soon become a joint Air Force/Navy service manual as part of an extensive revision project. The new edition will include such subjects as star identification charts, advanced navigation systems, aerial refueling, and also basic navigation programs for hand-held calculators. An updated chapter on low level navigation techniques has also been included. A publication date will be announced upon completion of final coordination.

Captain Terry N. Mayer, an HC-130 navigator with the 71st Aerospace Rescue and Recovery Squadron at Elmendorf AFB, Alaska, has recently been presented with the Institute of Navigation's "Superior Achievement Award" for outstanding performance as a practicing navigator for 1979. Captain Mayer was cited for his heroic navigation efforts in rescuing the victims of a civilian aircraft accident in the remote regions of Alaska. Congratulations from THE NAVIGATOR.

SHIRT-SLEEVE CELESTIAL

Captain Doyle H. GAMBRELL, JR.
384 AREFW
McConnell AFB, KS

Captain Monty S. HOFFSOMMER
384 AREFW
McConnell AFB, KS

Celestial ground training for navigators has taken a great leap forward in the past few months. At present, all SAC units possess a new celestial training device which greatly enhances the quality of ground training for the unit level navigator. Programmed text lessons and cassette-taped ground missions have been replaced by a microcomputer-based trainer. This article will briefly explain the rationale behind the new trainer and also introduce its uses. Before investigating this new approach to celestial navigation training, we should briefly discuss the aptitudes required of navigators who employ celestial navigation procedures.

A good navigator needs an analytical mind with a knack for working with numbers. Hundreds of computations are made on a typical flight; many of these computations are built upon the result of previously computed data. In navigation, response time is important, but not nearly as critical as the ability to evaluate data and produce correct computations. Usually, there is enough time to analyze the situation in depth before reacting.

GROUND TRAINERS

A trainer can vary drastically in equipment complexity and overall expense. Take, for example, the task of landing an airplane. To train a pilot on the ground in this area would require a device which effectively simulates cockpit instrumentation, motion sensations, and visual "out of the cockpit" perceptions. Obviously, we are talking about a complex visual simulator, comparable to the proposed Weapons Systems Trainer. In general, any training device which

must simulate physical events—receive and react in a unique way to operator inputs—will be very expensive. The more closely we must simulate the actual, the more expensive will be the trainer.

A Part Task Trainer (PTT) allows people to practice one specific part or step of an overall task. The learner may integrate previously learned knowledge with psychomotor skills and practice applying this knowledge and skill to a required standard of proficiency. To facilitate maximum transfer of training, a PTT should allow a required skill to be practiced in an environment simulating actual conditions as closely as possible.

A CELESTIAL NAVIGATION PTT

Celestial navigation yields readily to the part task trainer approach. We have developed a microcomputer-based system which can effectively ground train celestial navigation. Our Celestial Training Device (CTD) consists of three basic components: a microcomputer, an input/output terminal, and a printer. The CTD's total cost in its present configuration is under $5,000. Considering the price of jet fuel and the amount burned every day on celestial navigation training, payback would occur quite rapidly if celestial navigation time was reduced by only 10%.

The trainer is highly interactive. It allows the user to control mission parameters such as airspeed, heading, and altitude. Furthermore, the user sets the pacing and can "shoot" any of the celestial bodies available on an actual flight. Realistic drift and groundspeed information is constantly available, and some equipment failures can be induced. With the PTT, the user makes decisions based upon real-time data and knowledge of the rules and procedures for celestial navigation.

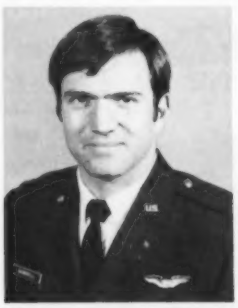
In addition, the operator needs no computer background. The trainer operation is quite simple; one can learn enough about the system to successfully turn it on, start, and fly a celestial navigation leg unassisted after only two supervised missions. This allows great scheduling flexibility with no instructor required. At the end of the mission, a computer printout provides evaluation and critique data.

With the CTD, it is also possible to set up conditions which may not be practiced in flight. If, for example, a navigator has become rusty in compass deviation procedures, valuable training can be given on the computer. With the trainer, we can induce compass deviation very easily. On the other hand, if we attempt to accomplish this additional training in an aircraft, it may be impossible to refresh the navigator in the computation and use of deviation if the aircraft has a good compass.

Many young navigators have limited flying experience other than celestial nav legs in the CONUS. With the CTD, we can fly polar grid, eastern longitudes, shoot low altitude bodies, practice pressure pattern navigation, or fly under any number of unusual circumstances.

Often an instructor has difficulty transferring important information to the navigator in flight because of distractions and high noise levels. With the CTD, we have a quiet training environment. In the early phases of training a technique or skill, distractions should be kept minimal although the student eventually must be able to handle them.

In conclusion, a few words about the flexibility of the trainer are in order. The trainer is a software device. The physical components of the trainer are similar to those in a small business computer system, i.e., maintaining accounts receivable, inventory, etc. Because it is a software-oriented device, the trainer is very flexible and will be a valuable training aid in areas other than navigation as the programs are developed. Computer enthusiasts in the field are encouraged to develop programs for enhancing trainer use in other areas, such as mission planning, scheduling, and testing. There is no limit to the trainer's usage within the bounds of ingenuity. If we equally share the programs, as they are developed, we will save "reinventing the wheel" and decrease costly manhours in performing tasks which can be done better and more effectively by a machine.



Capt Gambrell entered the Air Force via ROTC upon graduation from the University of Florida with a degree in Chemical Engineering. In 1976, he completed UNT and KC-135 CCTS. A member of the winning crew at the 1977 SAC Bombing and Navigation Competition, Capt Gambrell now serves with the 384 AREFW, McConnell AFB.

A 1974 graduate of Oklahoma State University, Capt Hoffsommer has a degree in Electrical Engineering. In 1975, he graduated from UNT and then KC-135 CCTS. During the 1977 SAC Bombing and Navigation Competition, he was on the winning team. Capt Hoffsommer presently is an instructor navigator with the 384 AREFW, McConnell AFB.

Flying in the ELECTRIC JET

- A Navigator's perspective

Captain Michael K. POMPHREY
388 TFW/DOW
Hill AFB, UT

"THE SINGLE SEATERS ARE COMING! THE SINGLE SEATERS ARE COMING!"

I closed out my tour in Europe in the last flight of F-4Es to launch from Zulu alert at Bitburg AB, Germany in 1977. The next Zulu scramble would be F-15s.

I hadn't been here at Hill AFB long before I learned that the 388th Tactical Fighter Wing would receive the first F-16s in the Air Force. Faced with closing another chapter of the Phantom II only to be reassigned to another base scheduled for conversion, I decided to follow the old adage—"If you can't lick 'em, join 'em."

Fortunately for me, the director of the 388th F-16 Program Plan designated a wing position for not only an EWO but also a Radar Strike Officer (RSO). Once manpower had authorized the position, volunteers were sought from within the wing. I had the upper hand as I was the additional duty F-4 Wing RSO and had already been working on several F-16 projects.

Selected by the wing as the first F-16 RSO, in July 1979 I became the first navigator to fly in the F-16. My orientation flight was a dream come true. Flying was no longer routine, and making nine G "bat" turns became the order of the day.

At that time, the wing had no Weapon Systems Officers (WSOs) to spare, so I maintained mission ready status in the F-4 for several more months. Staying in the F-4 later gave me the opportunity to "sand bag" a ride in the F-15 while TDY to Holloman AFB, NM; making me the first nav to have flown in both of these new "single seaters."

The Radar Electro-Optical Display (REO)

The F-16 radar has an expanded display and a Doppler beam sharpening capability. This makes producing accurate radar predictions for the F-16 particularly challenging.

As the Wing RSO, I verify the radar predictions produced by our Wing Target Intelligence personnel. To better prepare myself for this duty, I attended a one-week radar prediction school at Barksdale AFB, LA. Now I can evaluate radar predictions from the viewpoint of both the operator and the predictor, which is quite an advantage.

Coupled with the radar, the F-16 has an excellent INS and computer bombing system. To use these systems effectively, the pilots must have good radar-significant offset aim points (OAPs) and accurate target coordinates. I provide the pilots with selected OAPs and range target information through mission planning materials (such as varying scales of detailed charts and reconnaissance photos) and range data from our local in-flight aid. In anticipation of a new training requirement using a strategic training range (STR)—better known to some as radar bomb scoring or RBS—I'm currently modifying our STR data from the F-4 to accommodate the F-16.

As I become more familiar with the radar, I probably will teach the system to the pilots receiving F-16 training here. This will be particularly important as we begin training pilots fresh out of UPT who don't receive the same in-depth radar systems instruction as UNT students. Some of our IPs have also expressed a strong interest in my teaching them some of the finer points of using the radar.

Mission Planning

During higher headquarters and locally-directed exercises, I participate as a member of the Wing Mission Planning Cell. I develop deployment/employment routing and flight planning data and ensure that a detailed mission in-flight aid is assembled for each pilot involved.

On a routine basis, I work closely with the pilots and wing intelligence personnel in developing low level training routes (cut & paste) within our local military operating areas. We're currently developing specific requirements for a standard mission folder tailored for F-16 use. The project results will be proposed as a formal change to AFR 55-25, "Preparation of Mission Folders."

Armament Recording Program (ARP)

I monitor the acquisition, use, and processing of ARP materials. Originally limited to the F-4D radar scope camera, this film program now includes the F-16 gun/heads up display (HUD) camera. Shortly, it will also include the aircraft video tape recorder system, which can record images from both the HUD and the REO. A TGM-65 film program will be added later.

The F-16 Flight Simulator

While the facilities for the F-16 flight simulator are still under construction, my first involvement with this new aircraft was in helping set up the simulator program. I worked with the contractors in establishing the data base for the night visual system. I also helped develop the first two

simulator scenarios, including preprogrammed emergencies. From what I have seen, this system will be a vast improvement over the F-4 simulator for both the operator and the trainee.

Using a Computer Helps

With my many tasks, I have enlisted the aid of an electronic calculator. Besides the basic packages provided with the calculator, we have locally developed programs to handle such problems as low level flight planning, OAP component computations (for both the F-4 and the F-16), pop-up delivery formula computations, and fixed angle bombing computations for the F-4. As new requirements arise, we develop programs to ease the workload.

What's Ahead for Navs in Single-Seat Fighters

As I mentioned earlier, the current authorized manning of our Wing Weapons and Tactics Division includes both an RSO (2255Y) and an EWO (2275Y). I believe each TAC, USAFE, and PACAF F-16 wing will have an EWO slot (as I understand is the case with the F-15), and expect that each F-16 wing with an air-to-ground tasking will also have an RSO billet. Manning these positions will not, however, be automatic.

Of the WSOs allowed to transition to single-seat fighter assignments, the first candidates probably will be highly experienced WSOs (who have met at least their first flying gate) already stationed at a wing that is converting to F-15s or -16s, as happened in my case. This type of move would save PCS funds and use the talents of someone already familiar with the local flying area and the particular mission requirements of that wing. Naturally, single-seat wings will fill their nav positions through regular PCS channels, most likely with highly experienced WSOs from other weapons systems.

Being a WSO in an F-16 wing does have its drawbacks. Currently, F-15 EWOs do not receive gate credit for their F-15 flying, but they don't have to take tests or check rides either. Working with our local Stan/Eval personnel, I hope to develop a program for F-16 navs to meet annual AFR 60-1, "Flight Management," requirements. If this program is successful, it will require tests and annual check rides, but the F-16 flying time will then count towards gate time.

In summary, being the first navigator in the F-16 has been exciting, challenging and fun. I'm doing my best to lay a solid foundation for those navs who will follow me in flying "single-seat" fighters. Someday maybe you, too, will be the first nav on your block to fly in the "electric jet."

Capt Pomphrey graduated from the Air Force Academy in 1970 and has since received a master's degree from the University of Utah. After UNT and F-4 RTU, he was assigned to Ubon RTAFB, Thailand in 1972 and flew 189 combat missions. In 1973, he was reassigned to Bitburg AB, Germany and later completed SOS in residence. Capt Pomphrey presently serves as an F-16 Wing RSO with the 388 TFW, Hill AFB.

TO THE EDITOR

Continued from page 3

Dear Editor

24 April 1980

THE NAVIGATOR magazine is an outstanding publication. I especially applaud your efforts to focus on the importance of navigator professionalism, expertise and opportunity. You have spotlighted the navigator profession, and I look forward to future issues. I hope you will continue the operational aspects of navigation and bring more into focus the tremendous management jobs that result from navigation training, flying experience and crew discipline.

My first flying assignment was to the B-47 as a SAC Radar Navigator. The discipline required to successfully fly that aircraft is an integral part of the foundation of all of my Air Force work. The B-47 experience helped give me highly positive discipline in leadership, performance, decision making and teamwork. We flew the B-47 but even more we lived the B-47. The crew concept is a microcosm of the efficient organization—singular authority with pure teamwork toward a common, known, desired goal. The formula for success is simple and straightforward—always do more than is required and do it better. If the nav leg requires four celestial fixes, shoot seven. If the end nav point requirement is 1 nm, make your personal requirement ½ nm.

These experiences, building on my academic preparation in electrical engineering and systems management, prepared me to tackle the planning, development, and now the command management processes involved in the missile, satellite and aircraft acquisition business within our Air Force Systems Command.

While serving as Executive Officer to Lieutenant General O'Neil and Lieutenant General Phillips, I observed and participated in the complex arena of high-level decision making and problem solving involving space satellites and big space boosters. These technical, operational and command experiences all came into involvement with my assignment as Chief Avionics Engineer on the B-1 program. The complexities and high visibility encountered have demanded significant natural reliance on the basic navigation disciplines and lessons learned. With increasing leadership exposure came increasing responsibility. I enjoyed serving as Vice Commander of the 2750th Air Base Wing and ultimately the Commander of this Wright-Patterson AFB Wing which serves one of the largest Air Force and civilian populations in the Air Force. The problems were tough, but again the crew experience had provided a tough foundation for success.

The technical and leadership responsibilities have continued to increase with my appointment as Director of Materiel Management at the San Antonio Air Logistics Center, Deputy for Systems, and currently the Deputy for Reconnaissance and Electronic Warfare at the Aeronautical Systems Division.

To the casual observer the crew experience may seem very remote from these highly visible, highly complex jobs; but the structure is very clear to me. The foundation baseline of navigator discipline, crew coordination, and a strong sense of integrity and a natural love for America motivated a lot of great accomplishments. Navigator crew duty experience has given a strong foundation for leadership service in practically all Air Force mainstream management jobs.

I learned a most valuable lesson in the B-47. The B-47 is a great airplane with lots of offensive muscles and defensive capability. The combined offensive and defensive structure of the B-47 airframe, engines and avionics architecture permitted a very graceful degradation as systems failures occurred during the mission. The crew instructors of the 303d Bomb Wing taught us to always have a mind-set oriented to continue the mission even though degradations occurred. We often started out with a full system and concluded the mission with a stopwatch, dead reckoning and sometimes only a prayer—but we always finished the mission. Program management requires this same baseline commitment—our program managers are innovative and always have Plan B to continue the system development and acquisition—that's the main blessing flying the B-47 gave to me—"a strong Innovative Spirit and Plan B!" Thanks for your great effort in support of Air Force navigation.

God bless you. God bless America.

Sincerely

Titus C. Hall

TITUS C. HALL, Brigadier General, USAF
Deputy for Reconnaissance & Electronic
Warfare Systems
Aeronautical Systems Division

ADF

Captain Tom R. KONECNY
906 AREFS
Minot AFB, ND

Air refueling is becoming increasingly important. Not only can new weapon systems refuel in flight, but some older systems have been retrofitted as well, e.g., the C-141. Therefore, it is very important that tanker and receiver crews be thoroughly proficient with not only their primary but also alternate rendezvous equipment.

Frequently, crews are too reliant on the electronic air-to-air beacon without becoming familiar with alternate rendezvous procedures. How many times has the beacon capability been unavailable because of a malfunction or an unequipped receiver beacon, and a "WAG" maneuver put the receiver in tow by some miracle unbeknown to you? Adding an inoperative Doppler or severe weather to the situation will place an increasing strain on the limited time available to each crew. During this critical flight phase, navigators and crew members must be thoroughly familiar with all means available to make a smooth, professional alternate rendezvous. The ADF magnetic bearing is one method.

Usually ADF (Automatic Direction Finding) crosschecks are accomplished once during a rendezvous only because it's a tanker navigator's checklist item. In most cases, the information received is not used. How many times has the pilot responded, "Nav, I have him 18 degrees

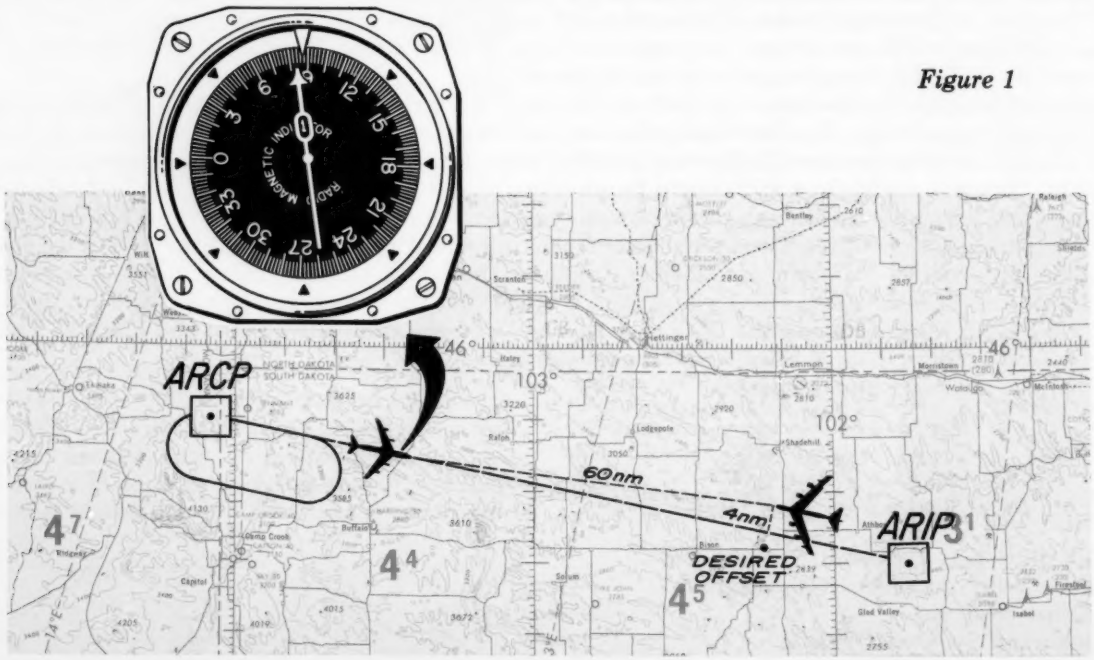


Figure 1

left," and your acknowledgment was simply a token response. When at least one beacon was operable, I remember what I did with the pilot's information—nothing! On the other hand, I remember more than one rendezvous when no beacon was available, and shudder when I think how unprofessional the rendezvous suddenly became. When two aircraft are closing at approximately 14 nm per minute, a simple technique is best.

The ADF magnetic bearing method is a simple technique for use during a point parallel rendezvous. Though this article presents the tanker's perspective, receiver navigators will also find it easily adaptable to their situation. Wind and drift are unimportant with this technique, except in maintaining reciprocal tracks and proper offsets, as determined from the checklist. The position of an aircraft is independent of its heading. Likewise, the relative bearing of two aircraft is independent of their headings. Therefore, the navigator must solicit a different response from the pilot. Instead of having the pilot respond with the number of degrees the ADF needle is left or right, one now wants the magnetic bearing off the compass rose, for instance "075°" or "273°."

Magnetic bearing incorporates two basic elements, i.e., the true track and mid-variation. *The true track is from the ARCP to ARIP (for the tanker) or ARIP to ARCP (for the receiver). Now we can compute the magnetic course.

In Figure 1, which is AR 12 West, the tanker's magnetic course would be 087° (100° true track minus 13° of east variation). The receiver's magnetic course would be 267° (280° - 13°). The second element is a thorough, commonsense knowledge of the "One in Sixty" rule: at 60 nm, 1 degree equals 1 nm; at 40 nm, 1½ degrees equal 1 nm; at 30 nm, 2 degrees equal 1 nm, etc. With these two elements, the magnetic course for the particular air refueling track and knowledge of the "One in Sixty" rule, a chart can be drawn up which will apply anytime that particular magnetic track is flown.

*** ARCP — Air Refueling Control Point - The location where the tanker and receiver rendezvous is completed prior to refueling. Tankers orbit at this point.**

ARIP — Air Refueling Initial Point - A point located upstream from the ARCP at which the receiver aircraft initiates a rendezvous with the tanker. Descent to refueling altitude will be made between ARIP and ARCP.

Most units have only 2 or 3 primary refueling tracks; therefore, 2 or 3 charts will suffice, if properly mission planned. A chart can now be made with nm range (vertical axis) and offset (horizontal axis) that yields appropriate magnetic bearings from the tanker to the receiver aircraft. The formula is: magnetic course minus (desired offset X degrees per nm) = magnetic bearing to expect (in degrees). An example for the tanker chart at a range of 30 nm and 10 nm offset equals: 087° - (10 x 2°) = 067°.

OFFSET / RANGE	3	4	5	6	7	8	9	10	11	12	13	14
60 nm	084°	083°	082°	081°	080°	079°	078°	077°	076°	075°	074°	073°
40 nm	082½°	081°	079½°	078°	076½°	075°	073½°	072°	070½°	069°	067½°	066°
30 nm	081°	079°	077°	075°	073°	071°	069°	067°	065°	063°	061°	059°
20 nm	078°	075°	072°	069°	066°	063°	060°	057°	054°	051°	048°	045°

Figure 2

OFFSET / RANGE	3	4	5	6	7	8	9	10	11	12	13	14
60 nm	264°	263°	262°	261°	260°	259°	258°	257°	256°	255°	254°	253°
40 nm	262½°	261°	259½°	258°	256½°	255°	253½°	252°	250½°	249°	247½°	246°
30 nm	261°	259°	257°	255°	253°	251°	249°	247°	245°	243°	241°	239°
20 nm	258°	255°	252°	249°	246°	243°	240°	237°	234°	231°	228°	225°

Figure 3

Though making the charts in Figures 2 and 3 appears to be an awesome task, remember once mission planned, the chart can be used again and again for that particular air refueling track. To illustrate the construction of Figures 2 and 3, use a constant desired offset of 10 nm on the KC-135 chart (Fig 2). At ranges of 60, 40, 30 and 20 nm the math is:

60 nm = 087° - (10 x 1°) = 077°
40 nm = 087° - (10 x 1½°) = 072°
30 nm = 087° - (10 x 2°) = 067°
20 nm = 087° - (10 x 3°) = 057°

Now that we know how to construct a chart, the next item to compute is the alter heading necessary to obtain the desired offset. Turn

ranges vary around a mean of approximately 20 nm, which simplifies the calculations. Keep in mind this is an alternate technique to achieve a smooth rendezvous with minimal paperwork calculations. At 60 nm range (nose-to-nose) each aircraft has approximately 20 air miles remaining, (60 nm - 20 nm) ÷ 2, until the desired turn range. At 20 nm, the "One in Sixty" rule says that 3° equal 1 nm. Therefore, a 3° alter, per nm off the desired offset, will correct the lateral separation by the time of the 20 nm range call. Two other convenient ranges where alters may be made are 40 nm and 30 nm. For 40 nm, the alter is computed as follows: (40 nm - 20 nm) ÷ 2 = 10 nm. At 10 nm, 1 nm in offset equals 6° or a 6° alter heading. Similarly, at 30 nm: (30 nm - 20 nm) ÷ 2 = 5 nm and at 5 nm, 1 nm equals 12°. Therefore, a 12° alter for every nm off the desired offset is appropriate. REMEMBER, only one aircraft does the altering! To simplify placing all the necessary information on one chart, either Figure 2 or 3, add a column to the left side:

DEGREES TO ALTER PER nm OFF DESIRED OFFSET	OFFSET RANGE	3	4	5	6	7	8	9	10	11	12	13	14
3°	60nm	084°	083°	082°	081°	080°	079°	078°	077°	076°	075°	074°	073°
6°	40nm	082½°	081°	079½°	078°	076½°	075°	073½°	072°	070½°	069°	067½°	066°
12°	30nm	081°	079°	077°	075°	073°	071°	069°	067°	065°	063°	061°	059°
NA	20nm	078°	075°	072°	069°	066°	063°	060°	057°	054°	051°	048°	045°

Figure 4

Now you have a complete chart which will allow you to fly the rendezvous without resolving formulas.

Two problems still remain; the total number of degrees to alter and in which direction. By constructing an expanded chart, such as Figure 4, you can find the bearing the pilot reads and immediately resolve it to the current offset. During a rendezvous is not the time to discover that your chart is incomprehensive. Anytime you are "inside" the desired offset, turn RIGHT, and anytime "outside," turn LEFT, regardless of the magnetic course.

Let's "fly" a few examples to illustrate this method. During a tanker-directed rendezvous on AR 12 West, a turn range of 19 nm and an offset distance of 6 nm have been computed (430 TAS and a receiver drift of 7 degrees left). Using a 60 nm hack from either the air-to-air TACAN or an ARTCC hack, the pilot reads a bearing of "083°." By referring to Figure 4, 083° at 60 nm is an offset of 4 nm, or 2 nm inside the desired offset. Remembering that at 60 nm the correction is 3 degrees per nm off desired offset (Figure 4), we would alter 6° RIGHT.

At 40 nm we may expect approximately one-half of the lateral separation error to have been corrected, resulting in an ADF magnetic bearing of 079° or 080° (5 nm offset). If, however, at the 40 nm hack, a bearing of 078° was attained, referring to Figure 4 would yield an offset of 6 nm and the 6° heading correction made previously should be taken out. On the other hand, if at 40 nm, the ADF showed "081°," a 4 nm offset would still exist (2 nm less than desired). At 40 nm, the alter is 6° per nm in error, or 6° times 2 nm for an alter of 12° right. Sit back for a second and recall that at 60 nm you altered 6° "away" from the receiver so only an additional 6° right is needed.

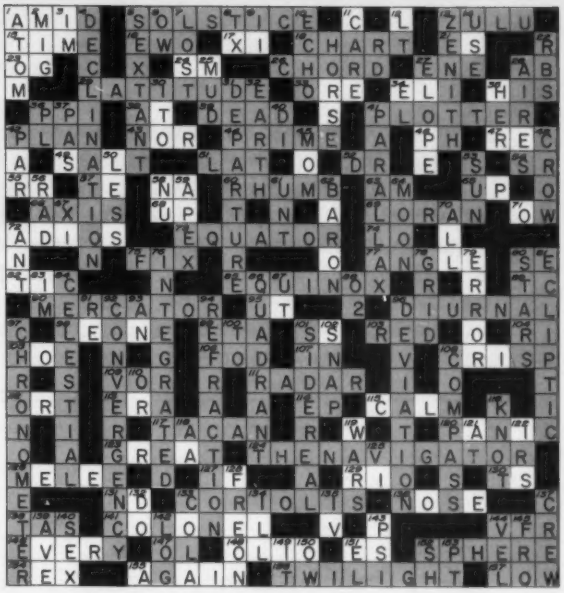
Now that we have discussed this alternate rendezvous method, the first time to use it is not when all else has failed! Any technique requires commonsense application and is best practiced and refined during a rendezvous which progresses normally. Only then will a smooth, professional rendezvous be accomplished when unscheduled deviations place additional stress on you and your crew. Pilots must be briefed that you need an ADF bearing—not the number of degrees left or right. As a navigator, you must be totally familiar with your chart and how to use it.

Think about the last time you were forced into an unscheduled alternate rendezvous or refueled a receiver without electronic beacon capability. If a large portion of your technique was "seat of the pants" and the receiver ended up at your six o'clock position, luck probably prevailed. If, however, your receivers regularly roll out around the 4 or 8 o'clock positions, then this technique will eliminate much of the undesired variance. Skill and professionalism greatly enhance safety, while promoting respect for the navigator force. Only with continued hard work, accuracy, and practice can your goals be accomplished and maintained.

In 1974, Capt Konecny graduated from St Olaf College and was commissioned through ROTC. He completed UNT in 1966, followed by KC-135 CCTS. Capt Konecny now serves as an instructor navigator with the 906 AREFS, Minot AFB.

Navwords

Answers to NAVWORDS puzzle from page 17



A 1961 Aviation Cadet graduate, Maj Blue was first assigned to the KC-135 at Loring AFB. In 1972, he was assigned to the C-130 in Taiwan before returning to the KC-135 at Grand Forks AFB in 1973. After duty in DOTN, Grissom AFB, Maj Blue served at Fairchild AFB until his retirement in December 1979.

High Flight to PAKISTAN

Dr Dallas R. BLEVINS
University of North Florida
Jacksonville, FL

Editor's Note: Over the years, the term "high flight" has become synonymous with the sometimes adventurous mission of ferrying an aircraft to a distant location, often island-hopping across one or more oceans. The following is a brief account of one such intrepid effort; only the names have been changed to protect...

In August 1960, the 4677th Defense Systems Evaluation Squadron (DSES) was one of only three B-57 units in the Air Force. I was a 21-year-old, almost-first lieutenant. A navigator/EWO, I had been with the 4677th five months.

One morning our Ops Officer reported that Pakistan was purchasing a large number of B

model B-57s. He said our unit had been selected to make the initial deliveries and asked who would like to make the first trip. My hand shot up immediately. I had grown up on the Great Plains of eastern New Mexico. The most exotic places I had ever visited were the hotels on Miami Beach (on a Loran mission as a cadet) and the San Diego Zoo! Besides, I doubted that I would ever have a better chance to see South America.

...the bars on my shoulders glistened and the brass on my wheel hat was simply dazzling.

Harry Broom and I were selected. We were told to go commmercial from our home station at Hill AFB to pick up the airplane on Bermuda Island. I silently wondered what the aircraft was doing so far east of its destination.

We were also told that the Canberra had been fitted with an extra fuel cell in the bomb bay so that it could make the required long distance flights. Further, teams of "High Flight" personnel were stationed along the entire route to provide charts and other assistance. What could be easier?

By the end of August we had our passports in hand and were ready to go to Bermuda. Our commercial routing was to be United Air Lines from Salt Lake City to Chicago, American from Chicago to Atlanta, and Southern from there to Charleston. A MATS C-121 was to take us from Shaw to the island.

I arrived at the Salt Lake City airport an hour before our commercial flight was to leave for Chicago. My class A uniform was resplendent; the bars on my shoulders glistened and the brass on my wheel hat was simply dazzling. After parking my TR-3, I unloaded my baggage and carried it as gracefully as possible toward the ticket counter.

In one hand was my parachute bag, which contained my chute, hard hat and navigator's kit—it must have weighed 40 pounds. The bag was so bulky that I had to hold it at almost arm's length. Each time I took a step it would swing out, then come crashing back into my knee. I soon discovered that I could blunt the blow by slamming my B-4 bag into it just before it reached me. By the time I finished my long, painful walk to check my baggage, I needed another shower.

I impatiently waited for Captain Broom, and envisioned him still laboring toward the ticket counter as our United flight was breaking ground. I wondered how I would get the B-57 to Pakistan all by myself.

Just before first call, Harry arrived in an Air Force vehicle. He was wearing a 505 uniform and flight cap. "Disgraceful!" I thought as my aviation cadet mind reviewed the Air Force dress code. Harry sauntered over to me broadly smiling while, behind him, the driver struggled with his baggage. He quipped something like: "Didn't you have a chance to shower before you got here, Dallas?"

The piston-engined ride to Chicago was long. My fully buttoned, tailored blouse was binding, and the pips on my wings dug into my chest. I was most uncomfortable. Harry snoozed peacefully, as he lounged in his 505s.

O'Hare was the first big civilian terminal I had ever seen. It was a little imposing at first. After I figured out what the word "Concourse" meant, I felt fairly confident about the place, and struck out to look it over. At the agreed upon time, I went back to the snack bar and waited for Harry. Before long I grew impatient, wondering how he could get lost in an airport. He found me and took me back to the American Airlines side just as the airplane was boarding for Atlanta. I had been waiting in the wrong snack bar!

A few days later we were on Bermuda Island. Since no one in transient maintenance knew either of us, we decided to have some fun on our test hop.

Everything but the engine, flight and navigation instruments had been stripped from both cockpits.

Both our flight suits had rank badges and nameplates, but no embossed aviation badges. Harry carried my seat-pack chute and navigator's bag to the aircraft and I carried his back-pack chute. We were arguing loudly as we stepped out of the bread wagon. I put my hard hat and his chute in the front seat; he put his hard hat and my chute and bag in the back.

We were rehearsing the standard navigator/pilot jokes as I led the walk-around. We got louder as we crawled aboard and put on our helmets. "The three most useless things in the world," I argued, "are runway behind you,

altitude above you, and a navigator that outranks you—SIR!"

Harry snapped back, "Lieutenant, a pilot preflights his airplane only if he thinks there may be a banana somewhere on it!"

"Captain, if you think you are so smart, you fly the airplane!" I shouted. Harry sat silently for a long moment. Then he ordered me to change positions with him. The transient maintenance personnel were still wide-eyed and open-mouthed as we taxied away.

We both understood the importance of our test flight. From Harry's viewpoint, this B model was an unknown. He had flown all 26 airplanes in our unit back at Hill, and he knew and trusted the maintenance personnel there. This airplane, however, had come from another unit. He had to test it under every possible flight condition.

My job was also clear cut, but not at all foreign. The low frequency radio was to be our only navigational aid. I was used to that. While the C and E models at Hill were TACAN equipped, none of our B models were. The 4677th usually flew beyond low frequency radio coverage over Canada, the Pacific, the Atlantic and the Gulf. I was comfortable carrying DR and supplementing with LF radio and map reading where possible.

Due to a latent mistrust of preflight winds and the fact that the first leg of our journey had to be over water, Harry and I devoted half the 1+30 test flight to our radio. We checked the loop and compass functions by flying both inbound and outbound on the range legs. We selected bearings at random and tracked in and out on them using the ADF function. We checked our accuracy by viewing our position relative to the lovely island below us. It was an OK flight.

My only question was where to put my wheel hat. Everything but the engine, flight and navigation instruments had been stripped from both cockpits. Since the bombing function had been controlled from my chair, my cockpit was the one most affected. There were large rectangular holes in both of my consoles. By laying my navigator's bag on the left console and using the swing-down table, I had enough room to work, but I lost my hat down one of the holes in the right side! After the test hop, I opened the generator access door and crawled inside to get my head gear. Harry pulled his flight cap out of a pocket in his coveralls and walked off, shaking his head.

The second B-57B delivery crew joined us as we waited on Bermuda for clearance to continue. Captain "Dutch" Kinser was the pilot, and 1st Lt John W. M. Davidson was the navigator. They would accompany us, switching lead periodically to break the pilot's boredom. John and I would navigate independently. We agreed to discuss our position over the air only if a great discrepancy occurred.

On 5 September we took off again. Lajes, the Azores, was our destination. I carefully stuffed my hat into a corner to insure that it did not fall into the generator bay again.

...the ship's navigator could back his radar bearing and range on us and he would know precisely where he was—somewhere in the middle Atlantic!

The flight was conducted under the influence of the Bermuda High. We had not been airborne long before I knew that the preflight winds were bad. I did a time and distance check outbound from Bermuda and found our groundspeed about right, yet our drift was not as great as forecast. The winds were southerly, but not as intense as predicted. The High had either shifted eastward or dissipated. If the High had shifted, the winds probably would remain southerly the whole flight with the velocity intensifying as we neared the center of the High, near Lajes. On the other hand, if the High were dissipating, the winds would shift to a northerly direction (about where they were supposed to be at preflight time), but the velocity would be a little lighter. By assuming a no-wind condition, I believed I could mitigate the uncertainty as much as possible. This would definitely place us north of our destination. If the LF radio at Lajes were suddenly shut down, or if our receiver suddenly failed, we could turn south at the ETA and run into one of the islands in the group. We had inadequate fuel to continue to the mainland.

The High Flight folks had given us a great deal of encouragement before we left. "Don't worry about the accuracy of the preflight winds. There is a Navy radar picket ship about half way out along your route. You should receive exact positions from them for about half an hour during the middle of the flight," they said. They were partly right.

About 2+15 after take-off we made radar contact with the picket ship. They had us on radar, but they asked us for a position. We had been beyond LF radio range for some time, so we had only a DR position. The Navy needed our help though, so

I upgraded our position and read back the coordinates and time of my "fix." From that, I reasoned, the ship's navigator could back his radar bearing and range on us and he would know precisely where he was—somewhere in the middle Atlantic!

At last we received Lajes radio, altered heading a little south, and stumbled across the Azores with our first 4+45 behind us. Because we were eastbound, the day was already spent when we landed. As we rode to debrief, Harry looked askance at my crushed wheel hat sitting crookedly atop my head.

I was having the time of my life, but we were going the wrong way.

We left the next morning for France. This leg was shorter, only 3+55, and a good part of it was over land. It would be a challenging flight, nonetheless. I gently placed my wheel hat behind me in the corner opposite the one I had used the day before—to keep it from being smashed again. As we taxied out, I wondered why they made us cross the Atlantic to get to South America. I was a brown bar though, so I kept my mouth shut.

The first half of the ride was over water. That day the closest operative LF radios were deep in Spain at Bilbao and San Sebastian. We would be in the air for 1½ to 2 hours with no electronic navigational aids, so we had a good chance of being blown off course.

The preflight winds were from the northeast along the entire route, almost at right angles to our desired track from Lajes to the Pyrenees. Both the groundspeed and drift outbound were close to those expected at preflight time. This gave us a great deal of comfort. We noted the coast-in time and maintained our preflight heading until we found a map-reading fix at Valladolid. I spun a wind, based on the admittedly inaccurate assumption that a straight line connected Lajes and our map reading fix, giving us a hypothetical place of landfall. This, together with the time, gave us an inaccurate fix on the coast of Portugal. We had nothing better, so we altered heading accordingly. We flew on without seeing anything that could be used as a genuine fix. We were delighted when the Spanish radio came in just about where we wanted it to. "Ignorance and superstition once again win out over science and skill," I sighed in relief. We had radios from that point for the brief flight remaining.

After landing I noted that my wheel hat was soiled. Apparently some hydraulic fluid had pooled in the recesses of the cockpit where I had so carefully placed it. Harry, without comment, donned his clean, crisp flight cap.

The High Flight personnel at Bordeaux told us some problems had arisen with our visas. There would be a delay, so we forced ourselves to spend four days in Paris. I wore a dress suit and hung a camera about my neck, taking shots of points of interest and trying very hard not to look like a tourist.

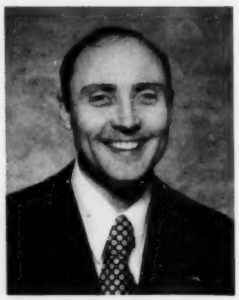
On 9 September we continued. This time they told us to go to Adana, Turkey—a flight of 4+20. The navigation was a piece of cake. There were LF radios everywhere. The weather was clear over the whole route, so we easily could have made the flight by map reading alone.

I was amazed at the small size of some European countries. From 40,000 feet, an observer can see both the east and west coast of Italy out the same side of the aircraft.

By this time, I was paranoid about the flight planning. When, I wondered, were we to make some progress toward South America? I was having the time of my life, but we were going the wrong way.

As usual, the High Flight personnel at Adana provided us with the JN charts. The ones they gave me this time were astonishing. First, I found out that Pakistan was not in South America! Second, I found out that between Tehran and Karachi the charts contained only latitude and longitude lines and lines of variation. The word "uncharted" was stamped all over them. This was to be another 4+30 over water leg—without the water!

Midway on our last leg into Pakistan, I gazed at the vast emptiness below and recalled the reassuring words of the mission support folks at Adana: "Never fear," they consoled, "if you go down out there, we'll buy you back from the Bedouins!"



Dr Blevins completed Aviation Cadet Navigator Training in 1959 and EWO training in 1960. He was then assigned to the 4677 Def Sys Eval Sq until he completed pilot training in 1963. Before his retirement for disability in 1966, he served in the first Air Force operational F-4 wing. Dr Blevins now is Assistant Professor of Finance, University of North Florida, Jacksonville.

HOW TO SUBMIT AN ARTICLE FOR THE NAVIGATOR MAGAZINE

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